

# THUNDER OVER THE DESERT

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In an *AFM* exclusive, **Georg Mader** spoke to the Pakistan Air Force's Air Commodore Mahmood Khalid at the Dubai Airshow about current and future plans for the Sino/Pakistani FC-1/JF-17 Thunder fighter



**Above:** Air Cdre Khalid by the JF-17 in the static park at Dubai. **PAF**  
**Below:** One of three Thunders at Dubai, 12.138, taxis out for another display.  
**Georg Mader**

**A**IR CDRE Khalid, a veteran F-16 pilot, is the Deputy Chief Project Director for JF-17 for the Pakistan Air Force (PAF) HQ in Islamabad and the Pakistan Aeronautical Complex in Kamra.

**AFM:** Many in the West had, or still have, the impression the JF-17 Thunder was first developed by Chengdu as the FC-1. When the PLAAF [People's Liberation Army Air Force] decided not to accept it into service, it seemed to have been offered, or 'given', to Pakistan, with some local modifications. Is that the case, or a wrong impression?

**Air Cdre Khalid:** This is incorrect for what became the Thunder. We needed aircraft to replace our ageing fleet of F-6s, F-7s and A-5s, as well as Mirages, which were becoming obsolete. As we'd developed light trainers like the Mushshak and co-developed a jet training capability with the Chinese around the K-8 Karakoram, we had an industrial base. We also maintained and overhauled all our aircraft ourselves.

It was logical to go for a fighter aircraft to our specific requirements. We had the knowledge and capability to go for a co-development with the Chinese right from the start.



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**Above:** An array of weaponry on display with the JF-17 in the static park at Dubai. Georg Mader

So we joined together and signed into this programme in 1999. The contract was always based on co-design, co-development and co-qualification. A large number of our specialists went to China and both teams worked together.

The first prototype was ready very quickly – in just two-and-a-half years from the drawing board to the first flight in September 2003. Six prototypes were built for certifying the avionics, initial weapons integration, fatigue analysis etcetera. In all, only the first nine aircraft were manufactured in China and then flown to Kamra, where our Pakistan Aero-

nautical Complex [PAC] is based. Local production started with a small batch of aircraft to mature our production process and for the assessment of operational capability and fine-tuning of the aircraft.

**AFM:** So its parameters – the design shape and avionics – were a combined effort and not a pre-set Chinese one? Where is the

final assembly line and what's the tempo of production?

**Air Cdre Khalid:** Yes, everything is a co-team effort – it was not a finished design presented to us. Of course, China was the lead nation, but we soon established some facilities and capabilities to tailor and develop the avionics ourselves, which are manufactured by Pakistan and

by China. According to the initial contract, 58% of the Thunder is from Pakistan and 42% imported from Chengdu and its suppliers.

The first operational jet was ready in 2007 and by 2009 we had ten aircraft. From then on, series production in the final assembly line at Kamra has speeded up. There, all flight testing takes place and the first operational squadron, No 26, was formed in May 2010.

**AFM:** Is the plant at Kamra a private enterprise or government-controlled?

**Air Cdre Khalid:** The whole project is controlled by the air force HQ. I am number two in the project. We task the industrial part to the Kamra complex, which is all under the control of the defence ministry except for small, niche manufacturers who work for us.

**AFM:** How many JF-17s will the PAF have in the end? Will

**“At the moment there are two fully operational JF-17 squadrons and a third is forming”**





the introduction of the F-16C/D-Block-52s change or alter numbers in the Thunder programme?

**Air Cdre Khalid:** No. At the moment there are two fully operational JF-17 squadrons and a third is forming. An exact number of how many there will be in the end is hard to predict, but we plan to build between 150 and 250 airframes of the type, including exports. With 16 to 20 per squadron, that might give the PAF between seven and ten squadrons.

**AFM:** You mentioned there's a flight testing establishment at Kamra. Is this just for post-production acceptance, or does it undertake ongoing development work, like an operational evaluation unit?

**Air Cdre Khalid:** Its job is twofold – to integrate new weapons and to validate the implementation of indigenously developed avionics, because we're constantly integrating new systems for future blocks.

**AFM:** Regarding the avionics suite, the fire control radar is a key Chinese component – is that correct?

**Below:** JF-17 12.142 taxis past one of its rivals for Middle Eastern fighter sales, Dassault's Rafale. *Georg Mader*



The JF-17 is an agile performer, as demonstrated by the vapour generated at the leading edge of the wing in the dry Dubai air. *Mike Kerr*

It has a mechanical antenna?

**Air Cdre Khalid:** Yes – it's the KLJ-7V2, but also co-developed with us. At this moment it is mechanically scanning, but in future blocks there'll be an E-scan radar fitted. It's under preparation.

**AFM:** So there's no need to 'Westernise' or replace some electronics?

**Air Cdre Khalid:** As I said, there are proposals and considerations to replace the existing radar and early warning [EW] systems, but at the moment we're happy with the performance of the current Chinese systems and have no plans to replace these with other third-country alternatives. I must emphasise the KG300G EW pod [produced by the China Electronics Technology Corporation (CETC)] is a powerful and reliable system, no there's no need to replace it urgently.

**AFM:** Are you happy

with the Russian Klimov/Sarkisov RD-93 engine? What about the need for a replacement in future blocks, such as the Chinese Liyang/Guizhou WS-13 or Western powerplants?

**Air Cdre Khalid:** First, the RD-93 is a very robust engine. We have flown it for 7,000 hours without a problem. Solid agreements are in place between the Chinese and the original Russian designers of the RD-93 to guarantee the supply of enough engines for our needs.

Regarding the future, yes, upcoming improvements might demand a more powerful engine. We're currently satisfied, but potential export customers may want another – like the EJ200, which is a good engine. If a customer wanted our design but with that powerplant, we would negotiate. If the new Chinese engine you mentioned is reliable and available, then fine.

**AFM:** Is the JF-17 on display

here in Dubai a regular Block 1 squadron aircraft?

**Air Cdre Khalid:** Yes, from the Black Panthers Squadron.

**AFM:** How many blocks do you think there'll be in the Thunder programme?

**Air Cdre Khalid:** Currently the last few from Block 1 are in the final stages of assembly. In parallel we're discussing the plans for the future Block 3 variant, now that the Block 2 model has a mature configuration. Block 3 now exists in the form of a conceptual design and a list of mission requirements, but with no concrete choice in the configuration of the onboard systems.

Given the consideration that we intend to go for a new block with enhanced capabilities after every 50 airframes, we could easily see a Block 4 or even a Block 5. Each time the modifications and capabilities should be implemented before the next block comes. That's the philosophy.

**AFM:** What is the daily operational configuration of these Block 1 aircraft?

**Air Cdre Khalid:** When the type first entered service it only flew with PL-SEII WVR-AAMs [within visual range air-to-air missiles] and fuel tanks, but the aircraft is now flying with SD-10 BVR [beyond visual range] AAMs, C-802A anti-ship missiles, the EW pod and several types of general purpose [GP]





and precision-guided bombs.

The JF-17 is qualified for QRA [quick reaction alert] duty. We can go straight up and shoot at the enemy. In standard configuration we carry two PL-5EII missiles, two SD-10 missiles and two or three fuel tanks. The aircraft would have the capability to carry four SD-10 missiles, but we decided to stay to the present configuration. However, a digital weapons interface is available on all hardpoints, which gives us a lot of flexibility for the carriage of ordnance.

**AFM:** You said the Kamra test establishment undertakes constant weapons integration. Are all the weapons and models you displayed in front of and under the aircraft at Dubai integrated? And did you need the Chinese industry or Chinese engineers to achieve that?

**Air Cdre Khalid:** The aircraft initially had the basic weapons capability of a short-range AAM, a long-range BVR AAM, the CB02AK against shipping and GP bombs of 500, 1,000 and 2,000lbs. In a second category – also integrated, tested and available – are the GPS-guided, winged bombs such as the LS-6 or similar GPS-directed ammunition from Pakistan and China. The laser-guided weapons are integrated as well. All aeromechanical integration, flight testing and release tests are done by our own personnel and specialists, without any Chinese input. We can buy a weapon on the free market and integrate it on the JF-17 on



The high-profile PAC Kamra presence in the static park at Dubai. Georg Mader

our own. A customer comes along with a foreign weapon? Fine. It's their job at Kamra to integrate it.

**AFM:** Under the right on the display aircraft wing is a mock-up of a large white air-to-ground weapon, the parameters of which remain rather sketchy so far – can you say more?

**Air Cdre Khalid:** This is the CM-400AKG, a brand-new weapon [designed and developed by China Aerospace Science and Industry Corporation (CASIC)] and only revealed at the Zhuhai airshow in November 2012. It is a mature and tested anti-ship weapon that's part of the operational weapon set of the JF-17 for Block 2. It's not conceptual, it's in service – a hyper-speed missile that's very difficult to intercept, hitting its target at Mach 4-plus or above. Its kinetic impact alone is enough to destroy any high-value target, like an aircraft carrier.

**AFM:** From what we know, the PAF should have begun integrating its nuclear-capable Ra'ad ALCM [air-launched cruise missile] onto the JF-17. Is this a prime target for Block 3?

**Air Cdre Khalid:** No. Regarding the Ra'ad, but also the H-4 glide bomb, we're primarily talking about [modifying] the wiring on Block 1 and Block 2 aircraft which are currently in, or about to enter, service – not just the forthcoming Block 3 variant. This makes good sense, to get on with the wiring as well as flight trials of these weapons on all JF-17s. All subsequent production aircraft will have these modifications integrated from the outset and there'll be no need for retrofits that result in long downtimes and lower available numbers.

**AFM:** Does this mean the death of the PAF's legacy nuclear deter-

rence platform, the Mirage V?

**Air Cdre Khalid:** Not necessarily. Ra'ad on the Thunder will certainly add to our stealthy ingress capability, due to the low cross-section of the cruise missile, and the JF-17 certainly is a better and more modern platform – about which there should be no debate. When it achieves full operational capability with the Ra'ad, that role will of course be withdrawn from the Mirages. But that doesn't mean that they'd be retired; they do a lot more than 'just' carry Ra'ads.

**AFM:** How about maintenance – are you self-reliant with everything?

**Air Cdre Khalid:** Yes, fully self-reliant. When it comes to maintenance the PAF has operational, intermediate and depot levels, just like everywhere in the West. Since JF-17 is a new aircraft, there's not been any depot-level ▶





maintenance yet, but we're in process of establishing this.

**AFM:** At the Zhuhai airshow in China, one could see both the JF-17 and the Chinese Chengdu J-10 manoeuvring in the sky. The JF-17 is a lighter fighter of course, but do you see it being superior in air-combat manoeuvring? A large delta wing like the J-10's is probably not that helpful in subsonic agility?

**Air Cdre Khalid:** Well, it may have seemed to have outdone the J-10 in airshow manoeuvres, but I know the Chengdu designers who have worked on the JF-17 as well as the J-10. Overall the J-10 certainly is a more powerful aircraft, but it seems to me that the JF-17 had won the crowd, maybe because of our superior piloting? But to be serious, we have very good experience in dissimilar combat against different types of aircraft in 'multi-bogey' engagement scenarios. During air combat manoeuvres with the PLAFAF, for example, PAF JF-17s were up against Chinese Su-27 Flankers in a number of encounters and achieved favourable results.

**AFM:** Is there the possibility of an FC-20 export version of the J-10 to Pakistan? Do you imagine that this could happen, maybe at the cost of the Thunder programme?

**Air Cdre Khalid:** My personal thoughts? Wishful thinking. But while this would be decided at a higher level than mine, from what I know or can see, an FC-20 or whatever will not be introduced into the PAF, at least not in the near to mid-term future. Why? The PAF is amidst the build-up of the JF-17 squadrons – just last March, President Zardari honoured and awarded more than 30 air commodores, group captains, wing commanders and squadron

leaders for the successful launch of the Thunder into the PAF fleet.

No other 'plane gives us this much capability at this cost. It's already carried out well over 10,000 sorties and, with towards 50 delivered, a third squadron is forming. In-flight refuelling from an IL-76 has been done. In parallel, the introduction of the Block 52 F-16s is happening, with systems like the Goodrich recce pod to master. So this means we're well served by fast jet assets and there's no real need to add a third platform, especially when the J-10 is also a fourth-plus generation jet we already have, and our planners and analysts should be focusing on the future fifth generation! But, as said, all this is beyond my daily business or responsibility.

**AFM:** Earlier this year at Paris, and again here at Dubai, one could see a large model of a two-seat FC-1 on the CATIC/AVIC stand. As you seem not to have needed a two-seater so far, would you like to have some anyway?

**Air Cdre Khalid:** Unfortunately, what I would like is of low priority. But seriously, I can tell you myself that the JF-17 is very easy to fly, even easier than the F-16. So our pilot training is not dependent upon a two-seat version. We designed it with the concept that we'll have a good simulation component, mirroring the three large displays and full HOTAS [hands-on-throttle-and-stick]. Not every type out there has, or needs to have, its own two-seater. However if some customer wants the twin-seat version, plans for production – as you saw at the Chinese presentation – are at an advanced stage. But detailed questions you'll have to address to AVIC or CAC, since this is concerning what they call 'Fighter China-1' or 'Fierce Dragon'.

**AFM:** You have mentioned customers several times – this creates the clear impression that you are here to present JF-17 to the export market. Are you allowed to do this? What weight do AVIC, Chengdu or CATIC have when it comes to export?

**Air Cdre Khalid:** Of course we're trying to export the design – the programme meant a considerable financial investment for Pakistan. But export policy is made jointly by us together. There's no independent sales and marketing for the Thunder. For international sales we have a joint sales and marketing team with our Chinese friends. It doesn't necessarily mean we all have to sit together on every meeting, but the Chinese side will always know what we're negotiating and we'll always know what they're negotiating. We don't leave them behind, and they don't leave us behind.

When we offer this aircraft to a customer, he makes his own choice in what weapons or avionics he wants. Then we get together to decide how to answer this or that demand; and if we're able or willing; or how we would answer various 'must' and 'shall' criteria. Then a contract could be prepared.

**AFM:** I've heard your aircraft mentioned in context to Argentina, Azerbaijan, Egypt, Serbia, Venezuela and similar niche markets. I remember an interview you gave last March to a Croatian colleague. Are you specifically marketing to such 'non-aligned' nations or generally to a whole region, like here in the Middle East?

**Air Cdre Khalid (smiling):** Your intel is impressive! Yes, these are all potential markets from where interest in the Thunder was expressed to us. Pakistan is also looking for export orders from several Arab countries as an affordable, low-cost option, below

the US\$30 million class. We took the aircraft to Farnborough, to Zhuhai and also the Turkish Air Force anniversary show in 2012. I think we also should go to Le Bourget in 2015. Several nations are interested in the JF-17, but have not yet placed any orders. I think this is largely due to the current turmoil in the Middle East, which has put a brake on procurement plans in some countries. But we see this as only a temporary setback. We need to further show to the markets how reliable and safe the Thunder is with its quadruple FCS [flight control system]. We've only lost one aircraft in an operational sortie, due to pilot error.

**AFM:** So all in all, that means you foresee a bright future for the Thunder in Pakistan and abroad?

**Air Cdre Khalid:** Of course! The JF-17 is a matter of national pride with the aircraft on track to become the backbone of the PAF for decades to come. We talked about the F-16 in the beginning – look at how far it has come from what it was in 1976 when it first flew as the lightweight fighter study. Compared to it the Thunder is just at the beginning of this lifespan: if you like, we're still in the F-16's 1970s!

Therefore we're likely to see quite a few modifications on this aircraft. Look at how far Turkey's modernised F-4 and F-5 fleets have come over the decades. But unlike them, we 'own' the JF-17 with all the source-codes and have a lot more freedom to develop and try out new things. That suggests modifications on a far grander scale. JF-17 will fly and perform like the F-16, and when the latest avionics and some Western weapons can be fitted on it, the aircraft will be of no lesser value than the latest US aircraft in the PAF inventory. There's a bright future for the Thunder, I am convinced.

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Above: A model of China's prospective FC-1 twin-seater design was on show in the exhibition halls. Georg Mader